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## A RAPTOR SURVEY IN THE BRAZILIAN ATLANTIC RAINFOREST

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**ABSTRACT.**—We give the results of a raptor survey conducted in August 1994 in the Parque Estadual Intervales, a well preserved area of Atlantic rainforest in southeastern Brazil. Point counts were more effective than transect counts. Ten species of raptors were detected. The presence of a pristine population of Mantled Hawks (*Leucopternis polionota*), Black Hawk-eagles (*Spizaetus tyrannus*) and Ornate Hawk-eagles (*S. ornatus*), gives to the area a remarkable interest for the conservation of birds of prey in Brazil. We also observed Turkey Vultures (*Cathartes aura*), Black Vultures (*Coragyps atratus*), Tiny Hawks (*Accipiter superciliosus*), Roadside Hawks (*Buteo magnirostris*), Short-tailed Hawks (*Buteo brachyurus*), Yellow-headed Caracaras (*Milvago chimachima*), Collared Forest-falcon (*Micrastur semitorquatus*) and possibly Grey-headed Kites (*Leptodon cayanensis*).

**KEY WORDS:** *Atlantic rainforest; birds of prey; Brazil.*

### Sequimiento de Rapaces en la Selva Atlántica de Brasil

**RESUMEN.**—Se dan los resultados de un seguimiento de rapaces efectuado en agosto de 1994 en el Parque Estadual Intervales, una zona bien preservada de selva atlántica del sureste de Brasil. Los censos puntuales se mostraron más eficaces que los censos lineales. Se detectaron 10 especies seguras de rapaces. En particular, destaca la presencia de una población saludable de busardo blanquinegro *Leucopternis polionota*, águila-azor negra *Spizaetus tyrannus* y águila-azor galana *S. ornatus*, lo cual dota a este área de un notable interés para la conservación de aves de presa en Brasil. Se observaron también el aura gallipavo *Cathartes aura*, el zopilote negro *Coragyps atratus*, el gaviñancito americano *Accipiter superciliosus*, el busardo caminero *Buteo magnirostris*, el busardo colicorto *Buteo brachyurus*, el caracara chimachima *Milvago chimachima*, el halcón-montés collarejo *Micrastur semitorquatus*, y posiblemente el milano cabecigrís *Leptodon cayanensis*.

[Traducción Autores]

The Brazilian Atlantic rainforest is considered among the areas of highest avian endemism in South America (Cracraft 1985). However, less than 8% of the original forest is left, and the remaining forest patches are small and isolated from one another (Fonseca 1985, Albuquerque 1995, Fundação SOS Mata Atlântica 1995). Birds of prey can be good ecological indicators of the conservation value of these patches, because some species require large amounts of well-preserved habitat to survive, while others increase in human-altered habitats. Although some spe-

cies are threatened by habitat fragmentation and destruction (Thiollay 1985), difficulties faced when studying rainforest raptors (Thiollay 1989) limit the information needed to design good conservation strategies. Several monitoring and research programs are being conducted in the Neotropical region to fill this gap (Thiollay 1989, Vannini 1989, Whitacre and Thorstrom 1992), but the Atlantic rainforest has received little attention. In this paper, we present the results of a pilot survey conducted in an Atlantic rainforest area of southeastern Brazil from 1–12 August

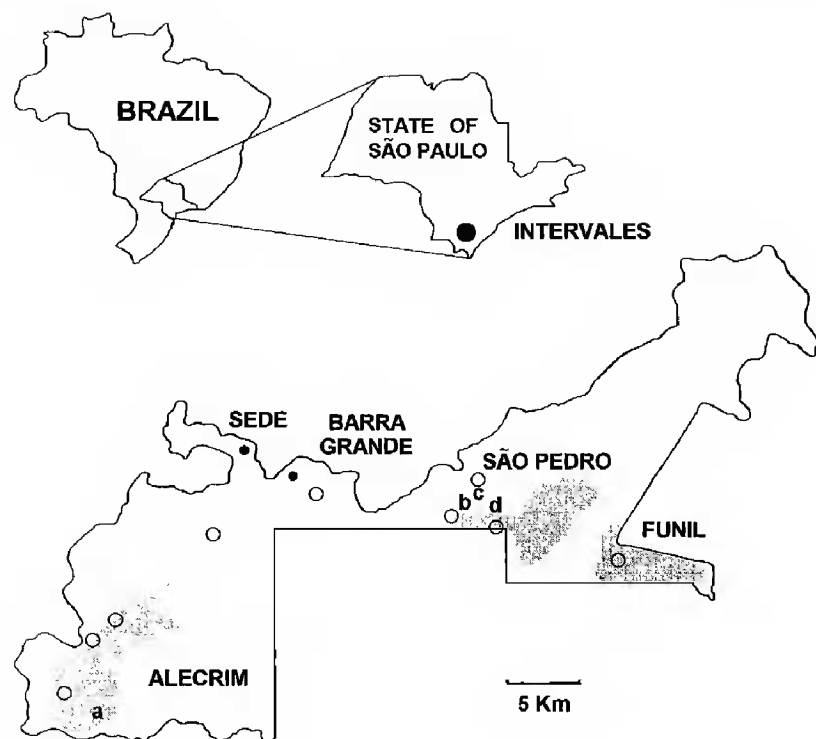


Figure 1. Map of the Parque Estadual Intervales, showing the location of the areas covered by transect counts (shaded), the location of the point counts (a, b, c, d) and the possible location of Mantled Hawk breeding territories (O). The location of the Parque Estadual Intervales Information Center (Sede) and Barra Grande station are also shown.

1994 to provide baseline data for future monitoring and conservation programs.

#### STUDY AREA AND METHODS

The survey was conducted in the Parque Estadual Intervales, a natural reserve comprised of 383 km<sup>2</sup> of continuous mature and secondary Atlantic rainforest (Fig. 1). The reserve is situated at the southeastern portion of the State of São Paulo, 80 km from the coast (24°20'S, 48°15'W), and is part of a mountain range about 900 km long known as Serra do Mar. The Parque Estadual Intervales, together with neighboring protected and private land (Parque Estadual Turístico do Alto Ribeira-Petar, Estação Ecológica de Xitué and Parque Estadual de Carlos Botelho), constitutes a 1168 km<sup>2</sup> area of well-preserved habitat. The area receives as much as 2500 mm of annual rainfall, concentrated mainly between November–March. The reserve is not hunted, and the palmito *Euterpe edulis*, one of the main components of the forest, is no longer being exploited. The forest covers all the reserve, except small openings around hamlets and guard stations. Mature or nearly mature forest communities cover 40% of the reserve, 40% is covered by old secondary forest, and 20% by young secondary forest found mainly along the roads and around inhabited areas (J.C. Guix pers. comm.). Areas around the Parque Estadual Intervales are agricultural land and grassland.

Three areas within the reserve were surveyed (Fig. 1). The Alecrim area ranging from 150–600 m elevation consisted of old secondary forest and included a small hamlet surrounded by pastures and crops. The São Pedro area (350–860 m elevation) was covered by mature and

old secondary forest. The Funil area (40–150 m elevation) was covered by old secondary forest on the hill slopes and young secondary forest on the lowest areas near to agricultural areas. For a detailed account of plant communities found in Intervales see Guix et al. (1992).

Raptor counts were conducted using transect and point count methods. No playback techniques (Whitacre and Thorstrom 1992) were used. We conducted 68 transect surveys on foot with the aim of recording monkeys, toucans, guans and birds of prey. Although transects were not specifically designed to count raptors, they allowed us to obtain an index of detections/km for several species. Transect lengths ranged from 1–22 km, but most were 2–3 km long ( $\bar{x}$  = 4.3 km, SD = 4.0). Except the longest transect that required a full day to complete, most surveys were conducted just after dawn or before dusk and lasted for 1.5–2 hr. The spatial arrangement of the transects was determined by the distribution of foot paths laid out by the guard staff to survey the reserve, but we felt it was representative of all the area. Transect counts were conducted by teams of 2–6 people. The weather was variable between counts, from clear to slightly rainy.

Point counts followed the method described by Whitacre et al. (1992). Counts were conducted in clear and calm weather by two observers from elevated points of the landscape, with a view angle of 60°–145°, and an unbounded view radius of at least 1 km. We selected points along the main tracks, offering good visibility of different rainforest areas. One count (a) was conducted from a midslope road in the Alecrim area and the other three (b, c, d) were conducted in the São Pedro area. Counts in the São Pedro area were done from the top of emergent trees that were about 2 km apart and gave unobstructed views of three different valleys. Counts were initiated 2.5–4.5 hr after dawn and lasted for 3–4 hr. The counting period was divided into 5 min intervals. For every interval, all raptors seen were recorded. Using this method, we obtained a list of species, the minimum number of groups and individuals observed and the proportion of 5-min intervals in which a species was recorded.

#### RESULTS AND DISCUSSION

On 68 transects, we walked a total of 290 km and made observations for 121 hr. We recorded birds of prey on 15 occasions (0.12 contacts/hr) for a total of 26 individuals of five different species. Raptors were observed on only 12 (17%) of the transects (Table 1). Mantled Hawks (*Leucopternis polionota*) were observed in the Alecrim area along the Pilões-Formoso river, between Alecrim and Sede. One pair was observed 6 km from Alecrim and another three hawks were observed simultaneously 8 km further along the river. In both cases, the birds were heard calling and were observed perching in small forested areas. We concluded that at least three or four pairs of Mantled Hawks inhabited the 14 km of the Pilões-Formoso river valley that we surveyed (Fig. 1).

Table 1. Summary of the results of transect counts in Brazilian Atlantic rainforest. Each figure corresponds to the number of individuals in one group. Numbers in brackets represent numbers of individuals counted on the same transect.

	ALECRIM	SÃO PEDRO	FUNIL
# of transects	31	27	10
Total length (km)	121	137	32
Habitat type	Old <sup>a</sup>	Mature <sup>b</sup>	Young <sup>c</sup>
<i>Leucopternis polionota</i>	(2,1) (1) (2) (1,1)	—	(1)
<i>Buteo brachyurus</i>	—	(1)	—
<i>Buteo magnirostris</i>	(1)	—	—
<i>Cathartes aura</i>	(1) (1) (1)	—	—
<i>Coragyps atratus</i>	(7) (2,3)	—	—

<sup>a</sup> Old secondary forest.  
<sup>b</sup> Mature or nearly mature forest.  
<sup>c</sup> Young secondary forest.

We conducted four point counts totalling 14.5 hr of observation and 174 5-min census intervals. Five raptor observations, involving 19 individuals of four raptor species (0.34 contacts/hr), occurred during three of the point counts. Of the 174 5-min census intervals, Black Vultures (*Coragyps atratus*) were seen during seven (4%), Mantled Hawks during 28 (16%), Tiny Hawks (*Accipiter superciliosus*) during one (0.6%) and Ornate Hawk-eagles (*Spizaetus ornatus*) during one (0.6%). At point count b, a pair of Mantled Hawks was recorded flying and perching in a small area of the forest for more than half the observation period and a single Mantled Hawk was observed flying over the forest at point count c (Table 2, Fig. 1).

Between counts, we also recorded a Black Hawk-eagle (*Spizaetus tyrannus*) flying over the São Pedro region, and a Collared Forest-falcon (*Micrastur semitorquatus*) and a possible Gray-headed Kite (*Leptodon cayanensis*) in the Funil area. Yellow-headed Caracaras (*Milvago chimachima*) were frequently seen in the Sede area in open habitats within the boundary of the reserve. One Mantled Hawk was recorded in the Barra Grande area near Sede and a second was seen next to the São Pedro station (Fig. 1).

No raptors were observed during a large proportion of the transect counts and, overall, they yielded fewer observations per unit time than did point counts. Although foot surveys detected some

Table 2. Summary of the results of the four raptor point counts, totalling 14.5 hr (174 5-min intervals) conducted in Brazilian Atlantic rainforest. For each species and count, the proportion of time intervals in which the species was seen, and the number of groups and individuals (groups, individuals) observed, are given. Habitat types are the same as in Table 1.

	POINT A	POINT B	POINT C	POINT D
Area	Alecrim	S. Pedro	S. Pedro	S. Pedro
Elevation	455 m	615 m	615 m	500 m
Date	2 Aug	9 Aug	9 Aug	10 Aug
Solar time (H)	0915–1300	0930–1330	1030–1330	0900–1245
Type	Road	Tree	Tree	Tree
Habitat type	Old	Mature	Mature	Mature
Duration	225 min	240 min	180 min	225 min
# intervals	45	48	36	45
<i>Coragyps atratus</i>	13% (2,9)	2% (1,4)	—	—
<i>Leucopternis polionota</i>	—	56% (1,2)	3% (1,1)	—
<i>Accipiter superciliosus</i>	—	—	3% (1,2)	—
<i>Spizaetus ornatus</i>	—	—	3% (1,1)	—



species not recorded on point counts, these would have also probably been detected if more point counts had been conducted. Except in the Alecrim area, where the transect followed a road with good views, the foot surveys were inside the forest where viewing raptors proved difficult due to dense vegetation. In fact, most species found during the transect surveys were not typical forest raptors (*Buteo*, *Cathartes*, *Coragyps*), and were seen above the canopy or in openings next to the road or hamlets. Although an extra amount of time and effort was needed to find good census trees and to climb them, the point count method allowed us to standardize the counts. However, secretive forest-dwelling raptors also escaped detection in our point surveys, probably because no playback techniques were used.

Of the species recorded in Intervales, records of Mantled Hawks were most important due to the fact that there is very little information on this Atlantic rainforest endemism. Its breeding range extends along the Atlantic coast of Brazil from Bahia to eastern Uruguay and Paraguay (del Hoyo et al. 1994). Mountain habitats upon which this species relies have quickly disappeared because of deforestation. For this reason, the Mantled Hawk, which was listed as a species of unknown status (Thiollay 1985, IUCN 1990), is now listed as an endangered (Thiollay 1994) or near-threatened (Collar et al. 1992, del Hoyo et al. 1994) species. All Mantled Hawks we observed were in adult plumage and their calling behavior suggested that the second half of the winter or dry season corresponded to the early portion of its nesting season in this area. This species was also reported in four out of the seven São Paulo State Atlantic rainforest areas visited by Willis & Oniki (1981), in the Serra do Tabuleiro on Santa Catarina State (Albuquerque 1995), and in different areas of disturbed and undisturbed habitats in Rio Grande do Sul, where it is reported as rare (Albuquerque 1986).

The Black Hawk-eagle and Ornate Hawk-eagle are typical large rainforest raptors. The Ornate Hawk-eagle has a higher preference for mature forests than the Black Hawk-eagle. Both species were found in the São Pedro area, which is the most remote of the sites we surveyed and the one with the least amount of disturbed forest habitats.

The Tiny Hawk and the Collared Forest-falcon were new records for the Intervales area and for the Atlantic mountain rainforest of the São Paulo State (Guix et al. 1992, Willis and Oniki 1981). If

we include the Barred Forest-falcon (*Microstur ruficollis*) which was recorded during previous surveys (Guix et al. 1992), 12 species of raptors have now been reported in the Parque Estadual Intervales. A total of only 15 species was found during an extensive ornithological survey of seven Atlantic rainforest areas of São Paulo State (Willis and Oniki 1981). Since no more than 20 diurnal raptor species are possible in the region (del Hoyo et al. 1994), we concluded that the Parque Estadual Intervales still contains a raptor community representative of the Atlantic rainforest and the area deserves protection from further fragmentation and destruction.

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